

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : TOYO TIRE & RUBBER CO LTD

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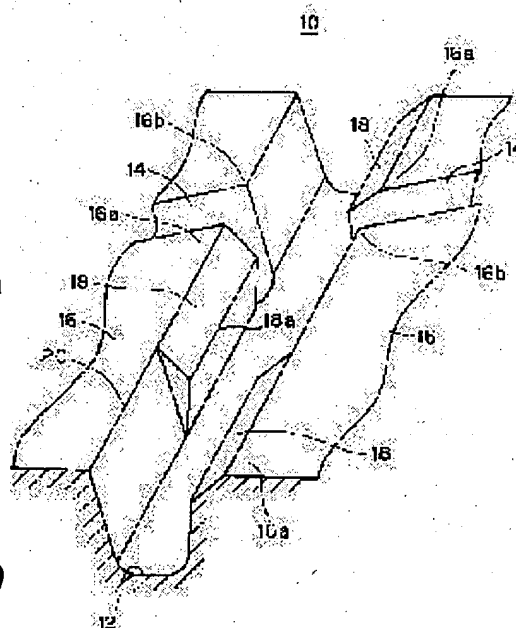
(72)Inventor : SATO YOSHIKI

## (54) PNEUMATIC RADIAL TIRE

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide a pneumatic radial tire capable of suppressing uneven wear based on rigidity fluctuation of a block, reducing resonance sound of an air column tube.

SOLUTION: In this pneumatic radial tire forming the block 16 by a linear longitudinal groove 12 extending in a tire peripheral direction in tread 10 and lateral grooves 14 which are arranged at intervals in a peripheral direction and extend by inclining in a tire width direction, the block 16 is provided with an acute angle part 16a formed by crossing the longitudinal groove 12 and the lateral grooves 14 at acute angles, and a projecting part 18 for irregularly reflecting compressed air generated within the longitudinal groove 12 when grounding the tire is provided on a groove wall surface on the longitudinal groove 12 side in the block acute angle part 16a.



## LEGAL STATUS

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CLAIMS

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[Claim(s)]

[Claim 1] It is the radial-ply tire containing air in which the block was formed of the transverse groove which sets spacing to the straight-line-like fluting and hoop direction which extend in a tire hoop direction in a tread, is allotted to them, inclines about the tire cross direction, and extends. Said block is a radial-ply tire containing air characterized by preparing the lobe to which scattered reflection of the compressed air which is equipped with the acute-angle section formed because said fluting and said transverse groove intersect an acute angle, and is produced in said fluting at the time of tire touch-down is carried out in the groove face side by the side of the fluting in said acute-angle section of said block.

[Claim 2] It is the radial-ply tire containing air in which the block was formed of the transverse groove which sets spacing to the straight-line-like fluting and hoop direction which extend in a tire hoop direction in a tread, is allotted to them, inclines about the tire cross direction, and extends. It is the radial-ply tire containing air characterized by having equipped said block with the acute-angle section formed because said fluting and said transverse groove intersect an acute angle, and preparing it in the groove face side by the side of the fluting in this acute-angle section so that the lobe which reinforces the acute-angle section concerned may be attained to a slot touch-down edge.

[Claim 3] The radial-ply tire containing air according to claim 1 or 2 characterized by preparing said lobe so that it may project from a groove face side over the abbreviation whole region of the depth direction of said fluting.

[Claim 4] The radial-ply tire containing air given in any 1 term of claims 1-3 characterized by the ratio of the cross section of said lobe to the cross section of said fluting being 5 - 25%.

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審査請求 未請求 請求項の数 4 O L (全 5 頁)

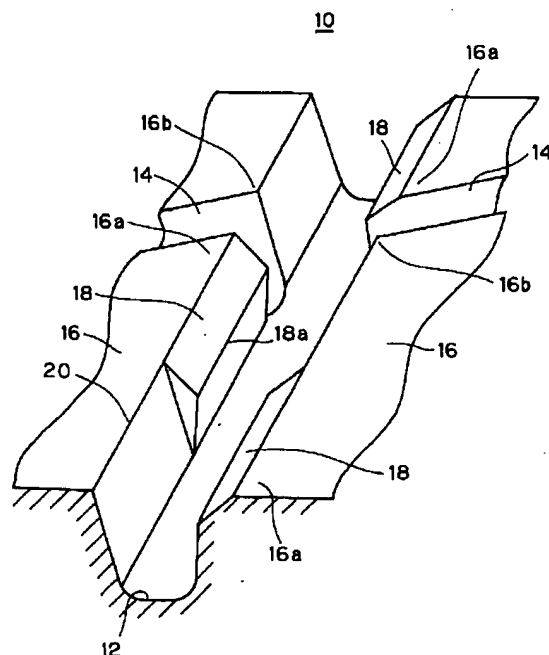
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(22) 出願日	平成13年3月29日 (2001. 3. 29)	(72) 発明者	佐藤 芳樹 大阪府大阪市西区江戸堀1丁目17番18号 東洋ゴム工業株式会社内
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(54) 【発明の名称】 空気入りラジアルタイヤ

(57) 【要約】

【課題】 気柱管共鳴音を低減させつつブロックの剛性変動に基づく偏摩耗を抑制することができる空気入りラジアルタイヤを提供する。

【解決手段】 トレッド10においてタイヤ周方向に延びる直線状縦溝12と周方向に間隔をおいて配されタイヤ幅方向に関して傾斜して延びる横溝14とによりブロック16が形成された空気入りラジアルタイヤにおいて、ブロック16は縦溝12と横溝14が鋭角に交差することで形成された鋭角部16aを備え、タイヤ接地時に縦溝12内に生じる圧縮空気を乱反射させる突出部18を、ブロック鋭角部16aにおける縦溝12側の溝壁面に設ける。



## 【特許請求の範囲】

【請求項1】トレッドにおいてタイヤ周方向に延びる直線状縦溝と周方向に間隔をおいて配されタイヤ幅方向に関して傾斜して延びる横溝とによりブロックが形成された空気入りラジアルタイヤであって、

前記ブロックは前記縦溝と前記横溝が鋭角に交差することで形成された鋭角部を備え、タイヤ接地時に前記縦溝内に生じる圧縮空気を乱反射させる突出部を、前記ブロックの前記鋭角部における縦溝側の溝壁面に設けたことを特徴とする空気入りラジアルタイヤ。

【請求項2】トレッドにおいてタイヤ周方向に延びる直線状縦溝と周方向に間隔をおいて配されタイヤ幅方向に関して傾斜して延びる横溝とによりブロックが形成された空気入りラジアルタイヤであって、

前記ブロックは前記縦溝と前記横溝が鋭角に交差することで形成された鋭角部を備え、該鋭角部における縦溝側の溝壁面に、当該鋭角部を補強する突出部を溝接地端部まで達するように設けたことを特徴とする空気入りラジアルタイヤ。

【請求項3】前記突出部が、前記縦溝の深さ方向の略全域にわたって溝壁面から突出するよう設けられたことを特徴とする請求項1又は2記載の空気入りラジアルタイヤ。

【請求項4】前記縦溝の断面積に対する前記突出部の断面積の比率が5～25%であることを特徴とする請求項1～3のいずれか1項に記載の空気入りラジアルタイヤ。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、空気入りラジアルタイヤに関するものである。

## 【0002】

【従来の技術】近年、車両の静粛性の向上に伴い、タイヤが発生する騒音の車両全体への寄与率が大きくなり、その低減が要求され、特に1kHz前後の高周波領域における騒音の低減が望まれている。このような高い周波数領域における主要な音源の一つに気柱管共鳴による音がある。

【0003】かかる気柱管共鳴音は、トレッドに形成されたタイヤ周方向に延びる直線状の縦溝に起因して発生する音であり、走行時にトレッド面と路面との間で圧縮された空気が柱状をなす縦溝を通じて急激に放出されることによって生じ、エアーボンピング音とも呼ばれている。

【0004】ところで、従来より、タイヤにおいては、周方向に延びる複数の直線状の縦溝と周方向に所定間隔をおいて配された多数の横溝とによって隔成された多数のブロックを備えるブロックパターンのタイヤがある。

【0005】かかるブロックパターンのタイヤに関し、特開平7-223410号公報には、ブロックの縦溝側

の溝壁面において、タイヤ周方向における中央付近に、縦溝を塞ぐようにひれ部を設けることが開示されている。同公報に開示の構成によれば、タイヤの接地時に縦溝内に生じる圧縮空気を上記ひれ部により乱反射させることができるため、上記した気柱管共鳴音を低減することができる。

## 【0006】

【発明が解決しようとする課題】上記公報に開示されたタイヤでは、縦溝に貫通する横溝がタイヤ幅方向に平行に延びているが、かかる横溝は、通常、ピッチピークを分散させるためにタイヤ幅方向に対して傾斜角度を付けて配置されている。このように横溝が傾斜している場合、各ブロックには鋭角部と鈍角部ができることから、ブロックの剛性変動が大きくなってしまふ。しかしながら、上記公報に開示の構成では、かかる剛性変動を低減することができず、従って、トレッドの摩耗過程において偏摩耗が発生してしまうという問題がある。

【0007】なお、特開平5-178024号公報には、ブロックパターンのタイヤにおいて、ブロックの鋭角部周縁の溝部が他の溝部よりも浅くなるように鋭角部に棚状の隆起部を設けて、鋭角部の剛性を高め、もって偏摩耗を低減することが開示されている。しかしながら、同公報には、気柱管共鳴音については何ら言及されておらず、また、上記のような溝底部に棚状に設けた隆起部では、溝壁面からの突出部が溝接地端部まで達していないことから、気柱管共鳴音の低減効果が得られない。

【0008】本発明は、上記の点に鑑みてなされたものであり、気柱管共鳴音を低減させつつブロックの剛性変動に基づく偏摩耗を抑制することができる空気入りラジアルタイヤを提供することを目的とする。

## 【0009】

【課題を解決するための手段】本発明の空気入りラジアルタイヤは、トレッドにおいてタイヤ周方向に延びる直線状縦溝と周方向に間隔をおいて配されタイヤ幅方向に関して傾斜して延びる横溝とによりブロックが形成された空気入りラジアルタイヤであって、前記ブロックは前記縦溝と前記横溝が鋭角に交差することで形成された鋭角部を備え、タイヤ接地時に前記縦溝内に生じる圧縮空気を乱反射させる突出部を、前記ブロックの前記鋭角部における縦溝側の溝壁面に設けたものである。

【0010】このタイヤであると、ブロック鋭角部の溝壁面に設けた突出部が、タイヤ接地時に縦溝内に生じる圧縮空気を乱反射させて気柱管共鳴音が低減される。また、上記突出部によりブロック鋭角部が補強されて、ブロック鈍角部との間の剛性変動が小さくなることから、偏摩耗を抑制することができる。

【0011】本発明の空気入りラジアルタイヤは、また、トレッドにおいてタイヤ周方向に延びる直線状縦溝と周方向に間隔をおいて配されタイヤ幅方向に関して傾

斜して延びる横溝とによりブロックが形成された空気入りラジアルタイヤであって、前記ブロックは前記縦溝と前記横溝が鋭角に交差することで形成された鋭角部を備え、該鋭角部における縦溝側の溝壁面に、当該鋭角部を補強する突出部を溝接地端部まで達するように設けたものである。

【0012】このタイヤであると、ブロック鋭角部が突出部で補強されていることから偏摩耗が抑制される。また、この突出部は、溝接地端部まで達するように設けられていることから、タイヤ接地時に縦溝内に生じる圧縮

空気乱反射させることができ、従って、気柱管共鳴音を低減することができる。

【0013】以上の本発明の空気入りラジアルタイヤにおいては、前記突出部が、前記縦溝の深さ方向の略全域にわたって溝壁面から突出するよう設けられていることが好ましい。これにより、ブロック鋭角部の補強効果を高めて偏摩耗の発生を効果的に抑制できるとともに、気柱管共鳴音の低減効果を高めることができる。

【0014】本発明の空気入りラジアルタイヤにおいてはまた、前記縦溝の断面積に対する前記突出部の断面積の比率が5〜25%であることが好適である。これにより、縦溝の排水性の悪化を防止しながら、気柱管共鳴音と偏摩耗を低減することができる。

【0015】

【発明の実施の形態】以下、本発明の実施形態について図面を参照して説明する。

【0016】図1は、本発明の一実施形態に係る空気入りラジアルタイヤにおけるトレッド(10)の要部拡大斜視図であり、図2は、トレッド(10)のパターンを示す平面図であり、図3(A)は、図2のA-A線断面図、図3(B)は、図2のB-B線断面図である。

【0017】このタイヤのトレッド(10)には、タイヤ周方向に延びる複数(ここでは3本)の直線状の縦溝(12)と、タイヤ周方向に所定間隔をおいて配された多数の横溝(14)とが設けられている。横溝(14)は、縦溝(12)により隔成される陸部を貫通し、タイヤ幅方向に関して傾斜して延びる溝であり、タイヤ周方向に所定間隔に配されている。

【0018】詳細には、図2に示すように、横溝(14)は、トレッド(10)の中央部における傾斜角度が、両側部における傾斜角度よりも大きくなるように、トレッド(10)の幅方向の2箇所屈折して延びる溝である。この横溝(14)のタイヤ幅方向に対する傾斜角度 $\theta 1$ は、 $10^{\circ} \sim 60^{\circ}$ であることが好適である。 $10^{\circ}$ 未満では、横溝(14)のピッチピークの分散が不十分であり、ノイズ性能が悪化してしまう。また、 $60^{\circ}$ を越えると、偏摩耗が発生しやすくなる。

【0019】上記の縦溝(12)と横溝(14)とにより、トレッド(10)には多数のブロック(16)が隔成されている。ブロック(16)は、タイヤ幅方向に4列にて形成

されている。各ブロック(16)の角部は、縦溝(12)と横溝(14)とが鋭角に交差することによる鋭角部(16a)と、鈍角に交差することによる鈍角部(16b)とに形成されている。

【0020】そして、図1、2に示すように、各ブロック(16)の鋭角部(16a)における縦溝(12)側の溝壁面には、当該鋭角部(16a)を補強する突出部(18)が設けられている。この突出部(18)は、タイヤ接地時に縦溝(12)内に生じる圧縮空気を乱反射させるための突出部でもあり、この実施形態では、図3(A)に示すように、縦溝(12)の深さ方向の略全域にわたって溝壁面から突出するよう設けられており、そのトレッド表面側の端が溝接地端(20)まで到達している。ここで、突出部(18)の溝深さ方向における高さ(a)は、縦溝(12)の深さ(b)の65%以上とすることが好ましい。

【0021】突出部(18)は、図3(A)に示すように、縦溝(12)の溝壁面を底辺として縦溝(12)内に突出する断面三角形(略二等辺三角形)をなしている。ここで、溝接地端(20)から上記三角形の頂点(18a)までの傾斜面における溝壁面に対する傾斜角度 $\theta 2$ は、 $10^{\circ} \sim 20^{\circ}$ であることが好ましい。なお、溝壁面の傾斜角度 $\theta 3$ は、通常 $0^{\circ} \sim 40^{\circ}$ の範囲内で設定される。溝接地端(20)から上記頂点(18a)までの溝深さ方向における高さ(c)は、縦溝(12)の深さ(b)の10〜50%であることが好ましい。 $10\%$ 未満では、突出部(18)の頂点(18a)が路面に当接することによる打撃音によりノイズ性能が悪化する場合がある。また、50%を超えると、気柱管共鳴音の低減効果を得にくい場合がある。

【0022】突出部(18)の断面積(詳細には、図3(A)における片側の突出部の断面積)は、縦溝(12)の断面積(詳細には、図3(B)に示す突出部のない部分での断面積)に対する比率が5〜25%であることが好ましい。 $5\%$ 未満では、縦溝(12)内に生じる圧縮空気を乱反射させる効果が不十分となって気柱管共鳴音の低減効果が得にくく、また、ブロック鋭角部(16a)の補強効果も低い。一方、25%を超えると、突出部(18)を図2に示すように縦溝(12)の相対する両側壁に設ける場合に、縦溝(12)の排水性が悪化してしまう。

【0023】なお、図3は、タイヤ幅方向中央の縦溝(12)における構成を示しているが、タイヤ幅方向両側部の縦溝(12)においても突出部(18)は同様に構成されている。

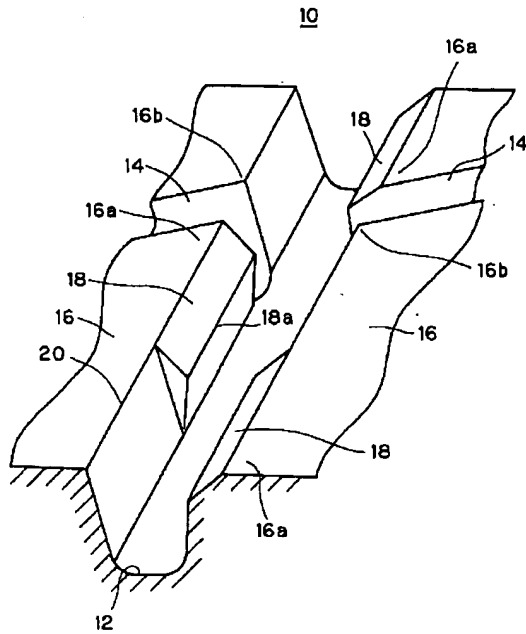
【0024】図2に示すように、突出部(18)は、縦溝(12)を挟んで相対して配置されたブロック列において、タイヤ周方向に互い違いに突出するように設けることが好適である。このように互い違いに配置することにより、縦溝(12)の排水性を悪化させることなく、効果的に縦溝(12)内の圧縮空気を乱反射させることができる。



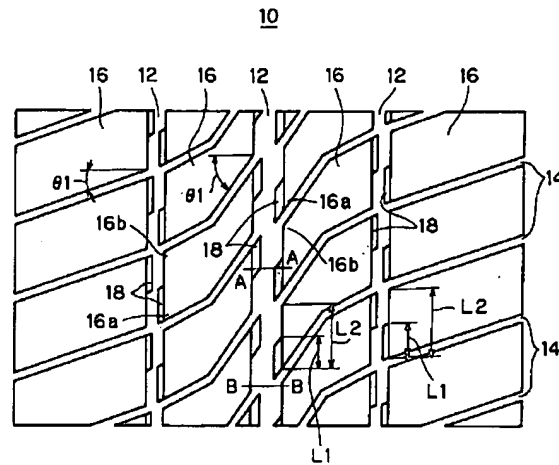
16b……ブロック鈍角部  
18……突出部

20……溝接地端部

【図1】

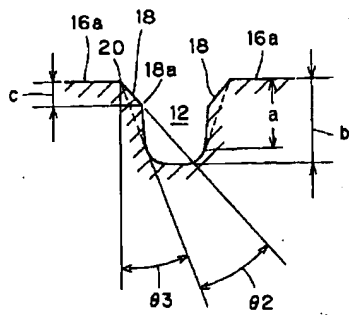


【図2】

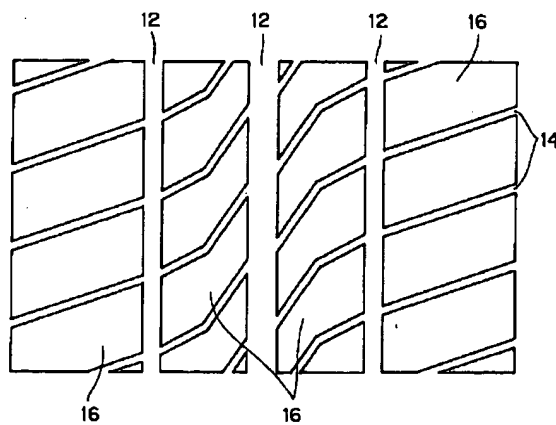


【図3】

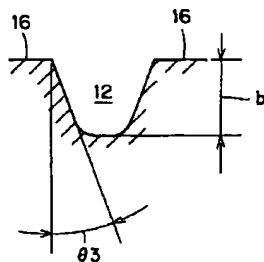
(A)



【図4】



(B)



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L9: Entry 2 of 2

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Oct 9, 2002

DERWENT-ACC-NO: 2003-304063

DERWENT-WEEK: 200341

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TITLE: Pneumatic radial tire for vehicle, has protrusion formed to vertical groove-wall surface, near acute angled portion of tread block

PATENT-ASSIGNEE:

ASSIGNEE

CODE

TOYO RUBBER IND CO LTD

TOYF

PRIORITY-DATA: 2001JP-0096958 (March 29, 2001)

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APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP2002293109A	March 29, 2001	2001JP-0096958	

INT-CL (IPC): B60C 11/04; B60C 11/11; B60C 11/13

ABSTRACTED-PUB-NO: JP2002293109A

BASIC-ABSTRACT:

NOVELTY - Multiple tread block (16) are formed by vertical and horizontal grooves (12,14). Each block has an acute angled portion (16a). A protrusion (18) provided to the vertical groove-wall surface near the acute angled portion, causes turbulent flow of compressed air produced during tire-ground contact.

USE - For vehicle.

ADVANTAGE - Side abrasion of the pneumatic radial tire is suppressed based on the rigid variation of a block, as turbulent flow of compressed air is caused during ground contact, by protrusion arrangement in groove-wall. Column pipe resonance is reduced.

DESCRIPTION OF DRAWING(S) - The figure shows the perspective view of principal tread portions of pneumatic radial tire.

Vertical and horizontal grooves 12,14

Tread block 16

Acute angled portion 16a

Protrusion 18

CHOSEN-DRAWING: Dwg.1/4

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ACUTE ANGLE PORTION TREAD BLOCK

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the radial-ply tire containing air.

[0002]

[Description of the Prior Art] In recent years, a large next door and its reduction are required for the contribution to the whole car of the noise which a tire generates with improvement in the silence of a car, and reduction of the noise in the RF field around 1kHz is desired especially. The sound by air column tubing resonance is in one of the main sound sources in such a high frequency domain.

[0003] This air column tubing resonance is a sound which originates in the fluting of the shape of a straight line prolonged in the tire hoop direction formed in the tread, and is generated, and it is generated by emitting rapidly the air compressed between the tread side and the road surface through the fluting which makes the shape of a column at the time of transit, and it is also called the Ayr pumping sound.

[0004] By the way, there is a tire of a block pattern equipped with the block of a large number conventionally \*\*\*\*(ed) by the transverse groove of a large number which set predetermined spacing to two or more straight-line-like flutings and hoop directions which extend in a hoop direction, and were allotted in the tire.

[0005] in the groove face side by the side of the fluting of a block, a fluting is plugged up near [ in a tire hoop direction ] a center about the tire of this block pattern at JP,7-223410,A -- as -- a fin -- preparing the section is indicated. the compressed air which is produced in a fluting at the time of the touch-down of a tire according to the configuration of an indication in this official report -- the above -- a fin -- since scattered reflection can be carried out by the section, the above-mentioned air column tubing resonance can be reduced.

[0006]

[Problem(s) to be Solved by the Invention] Although the transverse groove penetrated to a fluting has extended in parallel with the tire cross direction with the tire indicated by the above-mentioned official report, in order to distribute a pitch peak, to the tire cross direction, this transverse groove attaches whenever [ tilt-angle ], and is usually arranged. Thus, when the transverse groove inclines, since the acute-angle section and the obtuse angle section are made to each block, rigid fluctuation of a block will become large. However, with the configuration of an indication in the above-mentioned official report, this rigid fluctuation cannot be reduced, therefore there is a problem that partial wear will occur in the wear process of a tread.

[0007] In addition, preparing a ledged ridge in the acute-angle section in the tire of a block pattern, so that the slot of the acute-angle section periphery of a block may become shallower than other slots, raising and having the rigidity of the acute-angle section in JP,5-178024,A, and reducing partial wear is indicated. However, in the ridge which reference was not made at all about an air column tubing resonance, and was prepared in the above groove bottom sections ledged, since it has not reached to the lobe fang furrow touch-down edge from a groove face side, the reduction effectiveness of an air column tubing resonance is not acquired by this official report.

[0008] This invention is made in view of the above-mentioned point, and it aims at offering the radial-ply tire containing air which can control the partial wear based on rigid fluctuation of a block, reducing an air column tubing resonance.

[0009]

[Means for Solving the Problem] The radial-ply tire containing air of this invention is a radial-ply tire containing air in which the block was formed of the transverse groove which sets spacing to the straight-line-like fluting and hoop direction which extend in a tire hoop direction in a tread, is allotted to them, inclines about the tire cross direction, and extends. Said block is equipped with the acute-angle section formed because said fluting and said transverse groove intersect an acute angle, and prepares the lobe to which scattered reflection of the compressed air produced in said fluting at the time of tire touch-down is carried out in the groove face side by the side of the fluting in said acute-angle section of said block.

[0010] The lobe prepared in the groove face side of the block acute-angle section as it is this tire carries out scattered reflection of the compressed air produced in a fluting at the time of tire touch-down, and an air column tubing resonance is reduced. Moreover, since the block acute-angle section is reinforced by the above-mentioned lobe and the rigid fluctuation between the block obtuse angle sections becomes small, partial wear can be controlled.

[0011] The radial-ply tire containing air of this invention is a radial-ply tire containing air in which the block was formed of the transverse groove which sets spacing to the straight-line-like fluting and hoop direction which extend in a tire hoop direction in a tread, is allotted to them again, inclines about the tire cross direction, and extends. Said block is equipped with the acute-angle section formed because said fluting and said transverse groove intersect an acute angle, and it prepares it so that the lobe which reinforces the acute-angle section concerned may be given to the groove face side by the side of the fluting in this acute-angle section to a slot touch-down edge.

[0012] Since the block acute-angle section is reinforced with the lobe as it is this tire, partial wear is controlled. Moreover, since this lobe is prepared so that it may reach to a slot touch-down edge, it can carry out scattered reflection of the compressed air produced in a fluting at the time of tire touch-down, therefore can reduce an air column tubing resonance.

[0013] In the radial-ply tire containing air of the above this invention, it is desirable that said lobe is prepared so that it may project from a groove face side over the abbreviation whole region of the depth direction of said fluting. While heightening the reinforcement effectiveness of the block acute-angle section and being able to control generating of partial wear effectively by this, the reduction effectiveness of an air column tubing resonance can be heightened.

[0014] In the radial-ply tire containing air of this invention, it is suitable that the ratio of the cross section of said lobe to the cross section of said fluting is 5 - 25% again. Thereby, an air column tubing resonance and partial wear can be reduced, preventing aggravation of the wastewater nature of a fluting.

[0015]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0016] Drawing 1 is the important section expansion perspective view of the tread (10) in the radial-ply tire containing air concerning 1 operation gestalt of this invention, drawing 2 is the top view showing the pattern of a tread (10), drawing 3 (A) is the A-A line sectional view of drawing 2, and drawing 3 (B) is the B-B line sectional view of drawing 2.

[0017] The fluting (12) of the shape of a straight line of plurality (here 3) prolonged in a tire hoop direction and the transverse groove (14) of a large number which set predetermined spacing to the tire hoop direction, and were allotted to it are prepared at the tread (10) of this tire. A transverse groove (14) penetrates the land part \*\*\*\*(ed) by the fluting (12), is a slot which inclines and extends about the tire cross direction, and is allotted to predetermined spacing in the tire hoop direction.

[0018] As shown in a detail at drawing 2, a transverse groove (14) is a slot which refracts and extends in two places of the cross direction of a tread (10) so that whenever [ in the center section of the tread (10) / tilt-angle ] may become larger than whenever [ in the both-sides section / tilt-angle ]. It is [ whenever / tilt-angle / to the tire cross direction of this transverse groove (14) ] suitable for theta 1 that

it is 10 degrees - 60 degrees. Less than 10 degrees of distribution of the pitch peak of a transverse groove (14) are insufficient, and the noise engine performance will get worse at them. Moreover, if 60 degrees is exceeded, it will become easy to generate partial wear.

[0019] Much blocks (16) are \*\*\*\*(ed) by an above-mentioned fluting (12) and an above-mentioned transverse groove (14) at the tread (10). The block (16) is formed crosswise [ tire ] in four trains. The corner of each block (16) is formed in the acute-angle section (16a) by a fluting (12) and a transverse groove (14) intersecting an acute angle, and the obtuse angle section (16b) by intersecting an obtuse angle.

[0020] And as shown in drawing 1 and 2, the lobe (18) which reinforces the acute-angle section (16a) concerned is prepared in the groove face side by the side of the fluting (12) in the acute-angle section (16a) of each block (16). This lobe (18) is also a lobe for carrying out scattered reflection of the compressed air produced in a fluting (12) at the time of tire touch-down, with this operation gestalt, as shown in drawing 3 (A), is prepared so that it may project from a groove face side over the abbreviation whole region of the depth direction of a fluting (12), and has reached to the edge fang furrow touch-down edge by the side of that tread front face (20). Here, as for the height (a) in the channel depth direction of a lobe (18), it is desirable to carry out to 65% or more of the depth (b) of a fluting (12).

[0021] The lobe (18) is making the shape of a cross-section triangle which projects in a fluting (12) by making the groove face side of a fluting (12) into a base (the shape of an abbreviation isosceles triangle), as shown in drawing 3 (A). Here, as for theta 2, it is [ whenever / tilt-angle / to the groove face side in the inclined plane from a slot touch-down edge (20) to the top-most vertices (18a) of the above-mentioned triangle ] desirable that it is 10 degrees - 20 degrees. In addition, theta 3 is usually set up within the limits of 0 degree - 40 degrees whenever [ tilt-angle / of a groove face side ]. As for the height (c) in the channel depth direction from a slot touch-down edge (20) to the above-mentioned top-most vertices (18a), it is desirable that it is 10 - 50% of the depth (b) of a fluting (12). At less than 10%, the noise engine performance may get worse with the blow sound by the top-most vertices (18a) of a lobe (18) contacting a road surface. Moreover, if it exceeds 50%, it may be hard to acquire the reduction effectiveness of an air column tubing resonance.

[0022] As for the cross section (cross section of the lobe of one side [ in / in a detail / drawing 3 (A) ]) of a lobe (18), it is desirable that the ratio to the cross section (cross section in the part which does not have the lobe shown in drawing 3 (B) in a detail) of a fluting (12) is 5 - 25%. The effectiveness to which scattered reflection of the compressed air produced in a fluting (12) is carried out becomes inadequate at less than 5%, and it is hard to acquire the reduction effectiveness of an air column tubing resonance, and the reinforcement effectiveness of the block acute-angle section (16a) is also low. On the other hand, when preparing a lobe (18) in the both-sides wall with which a fluting (12) faces as shown in drawing 2 if it exceeds 25%, the wastewater nature of a fluting (12) will get worse.

[0023] In addition, although drawing 3 shows the configuration in the fluting (12) of the center of the tire cross direction, in the fluting (12) of the tire cross direction both-sides section, the lobe (18) is constituted similarly.

[0024] As shown in drawing 2, in the block train faced and arranged on both sides of a fluting (12), it is suitable for a lobe (18) to prepare so that it may project alternately in a tire hoop direction. Thus, scattered reflection of the compressed air in a fluting (12) can be carried out effectively, without worsening the wastewater nature of a fluting (12) by arranging alternately.

[0025] It is suitable for the die length L1 in the tire hoop direction of a lobe (18) that it is 20 - 60% to the die length L2 in the tire hoop direction of the groove face side of a block (16). At less than 20%, it is hard to acquire sufficient reinforcement effectiveness of the block acute-angle section (16a). Moreover, if it exceeds 60%, it will become the inclination for the wastewater nature of a fluting (12) to get worse.

[0026] As mentioned above, since the lobe (18) prepared in the groove face side of the block acute-angle section (16a) carries out scattered reflection of this compressed air when the air compressed between the tread side and the road surface at the time of transit passes along the inside of a fluting (12) by the radial-ply tire containing air of this becoming operation gestalt, an air column tubing resonance is reduced. Moreover, since the block acute-angle section (16a) is reinforced by the above-mentioned lobe

(18), the rigid fluctuation between the block obtuse angle sections (16b) is small, and, therefore, can control partial wear.

[0027] In addition, in the above-mentioned operation gestalt, although he is trying to prepare a lobe (18) in the acute-angle section (16a) in all blocks (16) of a tread (10), by this invention, it is not limited to this but the above lobes (18) may be formed in a part of blocks (16).

[0028]

[Example] In order to check the effectiveness mentioned above, the following examples and examples of a comparison were performed.

[0029] The tire of an example and the example of a comparison was created by the tire size 195 / 65R15 (use rim: 15x6JJ). It created with the tread pattern shown in above-mentioned drawing 2 with the tire of an example, and created with the tire of the example of a comparison with the tread pattern shown in drawing 4.

[0030] In the tire of an example, as a configuration of the lobe (18) in the fluting (12) of the center of the tire cross direction, it considered as  $a=5.3\text{mm}$ ,  $b=7.7\text{mm}$ , and  $c=3.0\text{mm}$   $L_1=13.0\text{mm}$   $L_2=26.0\text{mm}$   $\theta_2=20\text{ degrees}$   $\theta_3=20\text{ degrees}$ , and the ratio of the cross section of the lobe (18) to the cross section of a fluting (12) was made into 11% at the detail. Moreover, as a configuration of the lobe (18) in the fluting (12) of the tire cross direction both-sides section, the ratio of the cross section of the lobe (18) to the cross section of  $\theta_3=10\text{ degree}$  and a fluting (12) was made into 15%, and others were taken as the same dimension setup as the lobe (18) of the center of the above.

[0031] On the other hand, about the tire of the example of a comparison, other configurations were made the same as that of the tire of an example, without preparing a lobe (18).

[0032] 4 gangster doors of 2000 cc of domestic were equipped with each tire of an example and the example of a comparison, and the real vehicle estimated the noise engine performance (air column tubing resonance) and partial-wear. Evaluation followed, the time of a new article, when the depth of a fluting (12) was worn out 30%, and when 60% was worn out. A result is shown in Table 1.

[0033] In addition, about the noise engine performance, it expressed with the characteristic in non-\*\*\*\*\*, having measured the noise at the time of 60km/h in rate according to the specification of JASOc606, and having used evaluation at the time of a new article [ in / for the sound pressure of 1kHz / the tire of the example of a comparison ] as 100. It is shown that a result is so good that a characteristic is large.

[0034] About partial-wear (toe & heel wear), after real \*\*, 30%, whenever it wore the depth of a fluting (12) out 60%, it measured the abrasion loss difference during the block which faced across the transverse groove (14), set the tire at the time of a new article to 100, set the value at the time of 30% wear of the tire of the example of a comparison to 95, and expressed with the characteristic. It is shown that a result is so good that a characteristic is large.

[0035]

[Table 1]

	実施例		比較例	
	ノイズ	偏摩耗	ノイズ	偏摩耗
新品時	105	100	100	100
30%摩耗时	100	98	95	95
60%摩耗时	95	96	90	90

[0036] As shown in Table 1, compared with the tire of the example of a comparison, the air column tubing resonance is reduced and the tire of an example was excellent also in partial wear-proof.

[0037]

[Effect of the Invention] As explained above, according to the radial-ply tire containing air of this invention, the partial wear based on rigid fluctuation of a block can be controlled by having prepared the lobe in the groove face side of the block acute-angle section, reducing an air column tubing resonance.

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[Translation done.]